

moreover comprise two or more electrical actuators, for example for controlling opening of the closing mechanism and for activating and deactivating the external-safety and internal-safety functions.

5 In order to obtain the said functions, it is obviously necessary for the lock to be equipped with electrical components for signalling and control, for instance, microswitches, as well as electrical-connection components.

10 Since, as has been pointed out previously, in order to be able to interact with the lock striker, the locks described are normally positioned inside the damp region of the compartment in the door, it is necessary to adopt a whole series of precautions in order to prevent 15 contact of the locks with water from possibly jeopardizing their operation, such as, for example, the use of water-tight electrical components and actuators, which are decidedly more costly than similar components and actuators for which impermeability to water is not 20 required.

DISCLOSURE OF INVENTION

A purpose of the present invention is to provide a lock for a door of a motor vehicle, which will enable the drawback referred to above to be overcome in a 25 simple and inexpensive way.

A further purpose of the present invention is to

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CLAIMS

1. A lock (1) for a door of a motor vehicle comprising:
 - 5 - a closing mechanism (3) designed for coupling, in a releasable way, with a lock striker (2) for bringing about closing of said door;
 - a mechanical actuating assembly (4) of said closing mechanism (3), which comprises opening means (30, 38, 55, 57), for controlling release of said closing mechanism (3) from said lock striker (2), and means for inhibiting opening (41, 58), that can be selectively activated for rendering said opening means (30, 38, 55, 57) ineffective; and
 - 10 - electrical actuator means (5) comprising at least one output member (71, 72) interacting with said means for inhibiting opening (41, 58);
said lock (1) being characterized in that said electrical actuator means (5) are housed in a fluid-tight way in a single casing (70) and in that said output member (71, 72) traverses, in a fluid-tight way, a through hole (73, 74) of said casing (70) for co-operating with said means for inhibiting opening (41, 58).
 - 20 25 2. The lock according to Claim 1, characterized in that said casing (70) comprises at least two elements

(77, 78), which can be coupled together with interposition of first sealing means (81).

3. The lock according to Claim 2, characterized in that said first sealing means (81) comprise a gasket (81) co-moulded on a perimetral portion (79) of one (77) of said elements (77, 78).

4. The lock according to Claim 2 or Claim 3, characterized in that said hole (73, 74) is made entirely on one (77) of said elements (77, 78) and 10 houses a seal ring (103) co-operating with said output member (71, 72).

5. The lock according to any one of the preceding claims, characterized in that said means for inhibiting opening comprise at least one safety member (41, 58), 15 which interacts with said opening means (30, 38, 55, 57) and is displaceable along a pre-set direction between a disabling configuration, in which it renders said opening means (30, 38, 55, 57) ineffective and an enabling configuration, in which it enables actuation of 20 said closing mechanism (3) by said opening means (30, 38, 55, 57), and in that said output member (71, 72) is provided with a rotational motion about an axis (E, F) of its own, which is transverse to the direction of displacement of said safety member (41, 58) and is 25 provided, in a position corresponding to an external end (110, 111) of its own projecting from said casing (70),

with a portion (75, 76) for interaction with said safety member (41, 58), said interaction portion (75, 76) being eccentric with respect to said axis (E, F).

6. The lock according to Claim 5, characterized in
5 that said interaction portion (75, 76) is fixed to an end element (114, 115) coupled in an axially fixed position and in an axially mobile way on said external end (110, 111) of said output member (71, 72) and is kept in a pre-set angular position on the external end
10 (110, 111) by said elastic means (116, 117).

7. The lock according to Claim 5 or Claim 6, characterized in that said interaction portion is a pin (75, 76) engaged with a through hole (53, 67) of said safety member (41, 58).

15 8. The lock according to any one of Claims 5 to 7, characterized in that said opening means comprise a first actuating mechanism (31) and a second actuating mechanism (32), which can be connected, respectively, to an external handle and an internal handle of said door
20 for controlling release of said closing mechanism (3) from said lock striker (2) respectively from outside and from inside the motor vehicle, said means for inhibiting opening comprising a first safety member (41) and a second safety member (58), which are respectively
25 available in a corresponding said disabling configuration for rendering the respective said first

actuating mechanism (31) and said second actuating mechanism (32) ineffective, providing, respectively, an external-safety function and an internal-safety function, said electric-actuator means (5) comprising a 5 first output member (71) and a second output member (72), which traverse, in a fluid-tight way, respective said through holes (73, 74) of said casing (70), which are coupled, respectively, with said first safety member (41) and said second safety member (58).

10 9. The lock according to Claim 8, characterized in that said first and second output members (71, 72) have parallel axes (E, F) and are actuated by respective electrical control devices (87, 88).

15 10. The lock according to Claim 9, characterized in that said casing (70) defines an area (70a) for housing a manual control device (82, 156) of said first output member (71) and an additional electrical control device (155) of said second output member (72), which provides a function of child safety of said lock (1').

20 11. The lock according to Claim 10, characterized in that said housing area (70a) of said casing (70) is set on one opposite side of said second output member (72) with respect to said first output member (71), and in that said second output member (72) carries a first 25 attachment element (167), which can be connected to said additional electric-control device (155), and a second

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attachment element (133) which can be connected to said manual-control device (82, 156), said first attachment element (167) being angularly mobile with respect to said second output member (72) and said second 5 attachment element (133) being angularly mobile with respect to said second output member (72) and angularly coupled with said first output member (71).

12. The lock according to any one of the preceding claims, characterized in that said casing (70) 10 integrally defines an insulating body (149) of an electrical connector (148) for connection of said electrical actuator means (5) with an electrical wiring system of the motor vehicle.

13. The lock according to Claim 12, characterized 15 in that said casing (70) houses a plurality of warning elements (143, 144, 145, 146, 173) for signalling the operating condition of components of said first lock (1, 1'), and an electrical circuit (147) for connection of said electric-actuator means (5) and said warning 20 elements (143, 144, 145, 146, 173) with said electrical connector (148).

14. The lock according to Claim 13, characterized in that said warning elements comprise a plurality of microswitches (143, 144, 145, 146, 173), each of which 25 has an insulating portion (154) fixed to said casing (70) and electrical-connection means (150) for

connection to said electrical circuit (147) projecting from said insulating portion (154) and embedded in a resin.

15. The lock according to Claim 13 or Claim 14,
5 characterized in that said electrical circuit (147) comprises a plurality of conductive paths (152) carried by a flexible support made of insulating material (153) fixed to said casing (70).